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No. 20.

REPORT

OF THE

WEST VIRGINIA

STATE BOARD OF AGRICULTURE

FOR THE

QUARTER ENDING DECEMBER 30, 1910.

Entered April 13, 1906, at the Post Office, Charleston, W. Va., as second-class matter,
under the Act of Congress June 6, 1900.

FORESTRY.

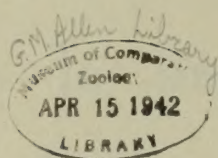
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CHARLESTON
THE NEWS-MAIL COMPANY
1911



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WEST-VIRGINIA

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FORESTRY

In submitting this publication on Forestry to the Citizens of West Virginia the State Board of Agriculture indulges the hope that some good may result and while it is not expected that any one person will be called upon to accomplish any great wonders, or to inaugurate any radical reforms, yet it is believed that with the hearty co-operation of all the people, and with a very little inconvenience to any one, we can protect the remnant, reforest the bald places not otherwise in use, and by eternal vigilance, which is the price of every thing that is worth having, defend our remaining forests from that worst enemy of all, The Forest Fire. If we could get a law on our Statute book that would prevent the wastful use of our forest resources, it would go a long way toward saving our present supply, and encouraging a new growth for the use of coming generations. Such law should not be so dictatorial or stringent as to make the lumberman think that he was being deprived of his rights, but should be in such form and spirit that he could understand that what is good for others is also good for him.

There are many other ways besides law and force to accomplish good results. Earnest effort along educational lines is a mighty good way to inspire the average citizen to do his individual best for the benefit of others as well as himself.

The school teachers of West Virginia with the proper assistance and encouragement of the patrons could accomplish more true forestry service in one term of school, than the legislature could do in a decade.

Suppose we get a law to compel the lumberman to cut carefully and savingly. Suppose every one becomes interested in keeping out the forest fires, and suppose all the schools teach forestry to all the children in the land, and we have an insufficient supply of birds what doth it profit? Look at the locust trees all over our State with their foliage turning brown in midsummer and matur-

ing two months before their time; examine their trunks carefully and you will find little holes bored through the bark into the sap where a little worm is consuming the very life of the tree, —they are there by the millions. The Red-Headed Wood Pecker, the Tom Tit and the Yellow Hammer if allowed to breed in sufficient quantity, is the only hope.

JOHN M. MILLAN,
Secretary.

WEST VIRGINIA FORESTRY PROBLEM.

BY PROF. T. C. ATKESON.

“What do we plant when we plant a tree?
We plant the houses for you and me;
We plant the rafters, the shingles, the floors;
We plant the studding, the lath, the doors;
The beams and siding, all parts that be;
We plant the house when we plant the tree.”

No state in this country has a more vital interest in forest problems and forest conservation than West Virginia and it is yearly becoming more urgent that our public spirited citizens and our law makers study the problem carefully and seriously with a view of saving to the state what can yet be saved of our rapidly disappearing forests.

Fifteen or twenty years ago it was estimated that West Virginia had nine million acres of land in original forests, and only a little further back an enthusiastic writer said, “There are in some of the interior counties immense primeval forests that are strangers to the woodsman’s ax and the saw of the lumberman.” True as that was then it is far from being true now, and with railroads building into every forest area the patch of primeval forest that is a stranger to the woodsman’s ax is rapidly growing harder to find. After the ax and the saw have done their deadly work, the biting flames, fed by the tree tops and mangled undergrowth, sweep over the hill-sides and leave a blackened trail of dreary waste throughout large area where once the finest scenery in the world charmed with its beauty and grandeur.

Years ago the pioneers stripped the river and creek valleys of their magnificent forests of most of the varieties of timber common to this latitude—Such as several varieties of oak, wild cherry, walnut, yellow poplar, pine, ash, maple, hickory, hemlock, spruce, birch, beech, sycamore and many other varieties, and rolled the logs into the streams, made them into rails or burned them in log heaps to make room for their primitive farming operations.

The complete destruction of our forests is sure to result if our present methods are continued, and there is probably no more urgent question now confronting our people or our legislature than

the conservation of our natural forests. The true policy of conservation should stop the wanton abuse and not the economic use of our forests. We should not have this generation go shivering to bed in order that the next generation may have fuel to keep itself warm, but it is certainly the duty of the present generation to stop wasting our natural resources which should be left as a heritage for the generations that are to come after us.

Many of the steeper and rougher hillsides that have been cleared should never have known the plow, and thousands of worthless acres in the state should be systematically reforested. Many an acre that will yet be cleared had better be allowed to develop a new growth of timber under proper care and attention. Much of it can never be made to produce any other crop that will pay nearly so well.

"To our fathers a tree was a cumberer of the ground, to our children it will be one of the most valuable assets of the farm; upon us, who live in the transition period between these two extremes, devolves the difficult task of breaking away from traditional habits of thought and adapting our methods to new and radically different conceptions. Under our system of land tenure the forest belongs absolutely to the land owners, and the State has no control over the forest separate from the ownership of the land. State forestry, therefore, resolves itself into two propositions; (1) the purchase by the State of lands for forest reserve and, (2) the education and assistance of the former in the maintenance of the farm woodlot. In States having large acres of mountainous land, unfit for cultivation, the first method is being adopted.

"As to the second method, there can be no question that the time is ripe for its immediate inauguration. Before either can perform its full service to the state, however, it must have the exact knowledge of the forest conditions of the state that can only be obtained through a thorough forest and soil survey."

Just what form the new legislation upon forestry should take it is not our purpose to indicate. Some effort should be made to put a stop to the wholesale destruction of young trees and every encouragement should be made to the reforestation of lands unfit for agriculture. The people should be instructed as to the value of forests and how to care for them, our tax laws should be made to encourage the planting of forests and the holding of forest lands from the lumberman's ax by private owners.

Interest in the subject of forestry is growing in West Virginia and all our state educational institutions should become centers from which to disseminate scientific forestry information while our College of Agriculture and Agricultural Experiment Station should give especial attention to the subject.

Forestry is a new science and its practical application in this country is even newer. In 1893 Gifford Pinchot undertook the first practical task in forestry on any considerable scale in this country in Biltmore, North Carolina. In eighteen years from that date the whole country has been aroused to the importance of better timbering methods and the conservation of all our natural resources, with emphatic stress upon forest conservation. For the wonderful interest now manifest President Roosevelt gave a full measure of praise to Gifford Pinchot. In 1898 the Division of Forestry transferred its chief interest to the field, and the last ten years has seen forestry develop into a science until it would seem that West Virginia must arouse herself to the practical application of that science which has in it more of importance to this state than any other in the Union. The question is up to our law makers, and up to them now. The question the whole state is asking is, "What are they going to do about it?"

THE MAMMALS OF WEST VIRGINIA.

Notes on the Distribution and Habits of All Our Known Native Species.

BY FRED E. BROOKS, W. VA. AGRICULTURAL EXPERIMENT STATION,
MORGANTOWN, W. VA.

Within the memory of many persons still living several interesting mammals have become extinct within the territory of West Virginia. At present others, that were once abundant, are becoming so scarce that it is an event of more than local interest to see or capture a specimen. Judging the future by the experience of the past we may conclude that within the next few years several of these that are now so rarely met with, will, like those first mentioned, cease to exist here.

The progress of civilization with its attendant influence has
*Author not responsible for
any typographical errors.*

wrought this change in the wild animal life of the State. The clearing away of the forests, lumbering operations, forest fires, and the trapper and hunter have followed up and harrassed the wild animals that once abounded in our forests until the last representatives of several species, hemmed in on every side, have made their last stand and fallen, or have stolen away to join their more fortunate fellows in the greater security of forest strongholds to the north and the west.

So far as the writer is aware, no systematic effort has been made to record collectively the names, distribution and habits of the native mammals of West Virginia except in the case of a briefly annotated list by Thaddeus Surber, of White Sulphur Springs, that was published in the report of the West Virginia Fish and Game Protective Association, for 1909. It is rather surprising that this important branch of zoology has been neglected so long by our West Virginia naturalists. As an opportunity for the scientific investigator and collector the field is full of interest while to the economic nature student it is no less attractive. A large part of the living of the early settler was derived from the meat and furs of wild animals while his crops and flocks were menaced constantly by squirrels, deer, bears, wolves and other wild mammals. Present day conditions have changed the relation which the wild animals formerly bore to man but at the same time they have created new problems of a similar nature. There are many mammals, especially among the rodents, that thrive and multiply in cleared, or partly cleared lands. Some of these have become sources of great annoyance on account of the damage that they do to cultivated crops; others, by reason of the numbers of tree seeds and nuts which they destroy, must have considerable influence on forestry conditions; still others devour vast numbers of injurious insects and thus have a beneficial effect on the farm and in the forest. Altogether, both as regards the injuries they do us and the benefits we derive from them, wild mammals have had and continue to have an important part in shaping conditions under which men live especially in agricultural districts.

For several years the writer has at odd times collected data on this subject and ventures to publish herewith a list of the known living and recently extinct mammals of the State together with brief notes on the different species. The notes record a few origi-

nal observations and many that are borrowed from other persons. With regard to many species only the most meager information seems to be obtainable. This paper is published, not with the hope of adding greatly to our present knowledge on the subject, but, rather, to create if possible an interest which will prompt hunters, trappers and other observers, to report any unusual or interesting occurrence of mammals that may be noticed in any part of the state. The abnormal increase or decrease of any species, the chance occurrence of rare forms, notable injuries done to farm crops or live stock by wild animals are all of interest and should be recorded permanently. It is hoped that the reader of these notes may be sufficiently interested to report any observations along this line to some one who will preserve the notes for the use of future students of our State's biology.

Virginia Opossum, *Didelphis virginiana* Kerr.

Common in all parts of the State except in the higher mountain regions. In recent years has invaded the lower part of the Canadian zone, and, with the clearing away of the forests, may ultimately be found over the entire State. My most boreal records are of two killed by Mr. Frank Houchin at Cranberry Glades, Pocahontas county, in the winter of 1908-09.

The opossum is valuable for its fur, for food and as a scavenger. It is a robber of birds' nests and an unwelcome visitor of poultry roosts. On the whole, it may probably be regarded as more beneficial than injurious.

Virginia Deer, *Odocoileus americanus* Exr.

The Virginia deer and its northern subspecies, *O. a. borealis*, or northern Virginia deer, were once abundant in all sections of the State. It is still rather plentiful in some of our forest wilds and is justly esteemed as our finest game animal. Probably those that remain here are mostly of the northern subspecies which is larger than the true Virginia deer, with heavier horns and shows a greater contrast between the red summer coat and gray winter coat. The respective ranges of the two have never been worked out carefully within our limits.

In early days venison and buckskin were almost indispensable articles in the home of the settler. Fortunately, deer were so plentiful that the supply of these commodities was usually ample. Many stories are told by old hunters which illustrate the former abundance of this animal. Mr. Van Buren Arbogast, who still lives at Durbin, Pocahontas county, has killed, according to records he has kept, over 600 deer. Hu Maxwell states that in 1841 three men named Mace, Harper and Stalnaker, living in the upper end of Randolph county, entered into a partnership to hunt to raise money to pay for land. They killed in one season 169 deer and 49 bears and carried the meat to Clover Lick where they sold it at three cents a pound. (History of Randolph County, p. 296.) Emerson Carney, of Morgantown, writing to *Forest and Stream*, says that as late as 1900 a hunter named John Burner killed during the season 35 deer and 3 bears, besides other small game, all in the mountains of Pocahontas county.

Such wholesale killing is, of course, deplorable and, at present, is impossible on account of the scarcity of deer. The protective laws which we have at present, if continued and enforced, will doubtless result in the near future in an increased number of this and other species of game animals.

Elk of Eastern Wapiti, *Cervus canadensis* Exr.

This animal, although for many years extinct in our limits, was once of rather common occurrence in our higher mountain regions. Mr. Van Buren Arbogast, of Durbin, can remember when his father, Moses Arbogast, saw a herd of seven elk in that region in 1845. He remembers also that his father killed an elk on the head of the West Fork of Greenbrier river but does not recall the year. John P. Hale, in his book entitled "Trans-Allegheny Pioneers," states that probably the last elk killed east of the Ohio river was killed by Billie Young, on Two Mile creek of Elk river, about five and a half miles from Charleston, in 1820. Hu Maxwell, in his history of Randolph county, however, shows that elk were killed in West Virginia after that date. He states that one was shot by the wife of Thomas B. Summerfield at a deer lick near the Sinks of Grandy, probably about 1830. Abraham Mullenix killed one near the same place sometime near 1835. About the year 1840 an elk was killed in Randolph county near the mouth of Red creek. Ac-

cording to Maxwell three elk were killed in Caanan valley (now Tucker county), by the Flanagans and Joab Carr about 1843. This is the last killing of elk in West Virginia that is recorded, so far as I am able to learn. The killing of the three in Caanan valley was two years previous to the seeing of the herd of seven, near Durbin, by Moses Arbogast and it is probable that others were killed later of which no records were kept.

American Bison or Buffalo, *Bison bison* Linn.

There is little doubt that the buffalo once roamed in considerable numbers over the greater part of the State. Early historians record that these animals were found in large herds along the valleys of the Ohio and Great Kanawha rivers. "It is said that vast herds of buffalo summered in Kanawha valley, in an early day, within reach of the Salt Springs, or 'Big Buffalo Lick,' as it was then called, and in the fall went to the grass regions of Ohio and Kentucky and the cane brakes of Kentucky streams. Their routes were—for Kentucky, down through Teay's valley, and for Ohio—down Kanawha to Thirteen-mile Creek, and over to Letart, where they crossed the Ohio river. Colonel Crogan, who came down the Ohio in a boat in 1765, encountered a vast migrating herd crossing at Letart." (John P. Hale in *Trans-Alleghany Pioneers*, p. 62). Hale says that the last buffalo killed in that region was by Archibald Price, on the waters of Little Sandy creek of Elk river, about twelve miles from Charleston, in 1815. Maxwell tells of a buffalo cow and calf that were discovered at a deer lick in Webster county about 1825. The calf was killed at the lick and the cow was followed to Valley Head, Randolph county, where she was shot. It is believed that no buffalo were killed in this State after that date.

Carolina Gray Squirrel, *Sciurus carolinensis* Gimelin.

The common gray squirrel of all parts of the State except the higher mountain regions. This squirrel is somewhat migratory and will be excessively abundant in a locality for a while and will then become very scarce and remain so until the food supply, or some other condition, causes it to return. Valuable as a game animal. Frequently damages grain especially corn in the roasting-ear. Black individuals of this species are occasionally found.

Northern Gray Squirrel, *Sciurus carolinensis leucotis* Gapp.

Considerably larger than the Carolina gray squirrel and confined in its range to the higher mountains where in some places it is common. In October, 1896, I was with a hunting and collecting party that killed about thirty very fine specimens in a chestnut woods on the summit of Young's mountain, Pocahontas county. Black individuals occur also in this form. It was formerly believed that the black squirrels belonged to a distinct species but it is now known that the black is but a color phase of the gray forms.

Northern Pine or Red Squirrel, *Sciurus hudsonicus gymnicus* Bangs.

Very abundant in the spruce forests of our mountains. Feeds on seeds of spruce and hemlock. I observed them feeding extensively on buckeyes on the slopes of Black mountain in 1896.

Southeastern Red Squirrel, *Sciurus hudsonicus loquax* Bangs.

Occasionally met with in considerable numbers in the hilly and less elevated portions of the State but is usually somewhat rare. Frequents open deciduous woods and tree-bordered lanes. A chattering, meddlesome little busy-body that does not fear the passerby and never fails to fling him a challenge of some sort.

Northern Fox Squirrel, *Sciurus rufiventris neglectus* Gray.

Was once somewhat common but is now rarely met with. Inhabits deciduous woods. Surber has taken a few specimens near White Sulphur Springs. I have seen it at French Creek and in a beech woods near Edray.

It is possible that the western fox squirrel, *S. rufiventer*, may occasionally occur in the western part of the State. The fox squirrels, like our other species, need further study in order to determine their respective ranges.

Ground Squirrel or Chipmunk, *Tamias striatus* Linn.

May be met with from the low river valleys to the spruce woods of our highest mountains. Occasionally becomes very abundant

and sometimes does considerable damage by pulling young corn plants in the spring in an effort to get the grain of seed-corn on the root.

Woodchuck or Ground Hog, *Arctomys monax* Linn.

Common in most agricultural districts and is occasionally met with in forests remote from human habitations. Feeds on corn in the roasting-ear, which it procures by breaking down the stalks; is also fond of pumpkins, young beans, grass and other cultivated crops. Frequently gnaws and scratches the bark of young fruit trees. Sometimes used as food and its hide is tanned in rural districts by crude, home-made processes, the tough light-colored leather which is obtained being used for gloves, strings, etc.

Virginia Flying Squirrel, *Sciuropterus volans* Linn.

Probably common in all parts of the State but is rarely seen on account of its nocturnal habits. A handsome and harmless little mammal which sleeps by day in hollow trees and comes forth at night to feed on nuts, seeds, etc. Has remarkable flying capacity for a mammal.

Beaver, *Castor canadensis* sp.

Once common but probably long since extinct within our limits. Hon. Andrew Price, of Marlinton, has informed me that there is a well-authenticated case of a beaver being killed in Pocahontas county about 1907 but he supposes it to have been an individual that had escaped from captivity at some unknown place. The many streams, mountains, and other natural features within the State that have the word "beaver" as a part of their name, indicates the general distribution of this mammal here in an early day. The same inference may be drawn in the case of elk, buffalos and other locally extinct mammals, from the number of times their names occur in the geography of the State.

Cloudland Deer Mouse, *Peromyscus maniculatus nubiterrae* Rhoads.

Found only in the Canadian zone where it dwells in crevices of

rocks, old logs and other hiding places in the dense, evergreen forests. I have trapped it at Spruce Knob, Cheat Bridge, Cranberry Glades, and in great numbers at "Hanging Rock," an old hunters' camp on the mountain ridge between Cherry and Cranberry rivers. This species has a much shorter tail than the deer mouse found on the lower levels and the color of the back and sides is more of a sooty brown.

White-Footed or Deer Mouse, *Peromyscus leucopus noveboracensis* Fisch.

This common and handsome little mouse of deciduous woods is more often known by the name of "woods mouse" than any other. It is found in all parts of the State below the spruce belt. It lives in the woods but occasionally invades cleared lands where it sometimes enters houses, especially new buildings near woodlands. The upperparts and sides are russet or fawn-colored and the underparts are pure white. The ears are large and the eyes large and bright. It is a nocturnal species, moving about by day only when disturbed. It is usually harmless although it sometimes steals a little grain and it a great gnawer when it chances to enter a house.

Surber's Harvest Mouse, *Reithrodontomys lecontii impiger* Bangs.

The first specimens known of this form of a common, southern harvest mouse were taken at White Sulphur Springs by Thaddeus Surber. Specimens have since been collected in one or two other localities.

This tiny mouse lives in open fields and is inoffensive in its habits. In its general appearance it resembles a white-footed mouse but is much smaller.

Pennsylvania Wood Rat, *Neotoma pennsylvanica* Stone.

This, our only native rat, was once far more common in West Virginia than it is at present. However, it is still abundant in a few localities. In early days it frequently came into the houses of settlers and had a habit of carrying away dried fruits and almost

any other small object that it could get hold of. It was found to be very abundant at Franklin in the winter of 1909-10 where a large colony was living in a ledge of rocks near the town. They were present, but less plentiful, in the vicinity of Circleville. E. A. Goldman, of the U. S. Biological Survey, (N. A. Fauna No. 31) lists 11 specimens from Franklin, 1 from Hillsboro and 21 from White Sulphur Springs.

It is remarkable that this rat, which for so many years had been a familiar animal to the early settlers of this section of the country, remained unknown to science until the year 1893 when Mr. Witmer Stone obtained a specimen in Cumberland county, Pa., and described it, bestowing the technical name given above.

The Pennsylvania wood rat is somewhat larger than the common gray Norway rat. The upperparts are gray and the underparts white. Eyes large and bright, ears large and tail long and hairy. It constructs large nests of sticks and other rubbish in which it lives. A strong odor pervades the locality where a colony has its home. The food is nuts, dried fruits, grain and other vegetable matter. It also feeds on flesh and has a habit of gnawing old bones. It can not be regarded as being seriously harmful.

Red-backed Mouse, *Eutamias carolinensis*.

This mouse has been taken in nearly all localities where I have trapped in the spruce belt of this State. It is probably found also in the upper Transition zone. It was very abundant along the borders of Cranberry Glades and on Kennison mountain, Pocahontas county, in the summer and fall of 1909. Surber says of this mouse, "Common in Canadian zone, in some places abundant."

The back is bright chestnut and the belly whitish. The tail is $1\frac{1}{2}$ inches long, the entire length of the mouse being about $5\frac{1}{2}$ inches. It is active both by day and night and in dark spruce forests may frequently be seen during the day running about over the ground or along moss-covered logs reminding one, in its motions, of a chipmunk. It feeds on nuts, seeds, wild fruits, leaves, insects, etc. This mouse is an interesting and inoffensive little animal.

Common Meadow Mouse, *Microtus pennsylvanicus* Ord.

Probably better known to the average dweller in the country

than any other animal of its class except the common house mouse. Found in all the cleared parts of the State; less frequently in the woods. Loves moist places and is usually most abundant in the vicinity of water, though it ascends dry hillsides and inhabits upland meadows in great numbers. I once trapped a specimen within a few yards of the summit of Spruce Knob, Pendleton county, the highest point in the State.

This mouse spends most of its life above ground in runways which it extends on the surface through grassy and weedy places. Its globular nests of fine grass are placed both above and under ground. There are usually underground burrows about its haunts which it is quick to enter when pursued by an enemy.

The form of this mouse is thick and stout, with strong jaws. The upper parts of the body are gray-brown and the underparts light gray washed with yellowish. A full-grown specimen is $5\frac{1}{2}$ inches in length, the tail being $1\frac{1}{2}$ inches in length. It feeds on vegetable matter and occasionally on insects. Frequently found in corn shocks that have been left standing in the field, where it feeds on the grain. Most of its food consists of grasses and is probably less injurious than is usually supposed.

Rock Vole of Yellow-cheeked Meadow Mouse, *Microtus chrotorrhinus* Miller.

Until recently this mouse was not known from any locality south of the Catskill mountains in New York. On August 8th, 1909, I trapped a specimen of the species near Cranberry Glades. It was caught under the side of a half-decayed log that lay on the bank of a stream a few rods above where the stream entered the glade. Afterward other collectors secured several specimens in the same locality. This is a rare mammal and but little is known in regard to its habits.

Northern Pine Mouse, *Microtus pinetorum scalopsoides* A. & B.

This very injurious mouse has been collected at White Sulphur Springs, Terra Alta, French Creek, Morgantown, Buckhannon and Peterstown and probably occurs in considerable abundance in all sections below the spruce belt. As compared with the common meadow mouse, this species is smaller, the tail shorter, the fur finer

and shorter and it lives almost exclusively underground. It travels in burrows, made by itself and by moles, and feeds on fine roots, root bulbs, the bark of wood roots, etc. It often eats potatoes, lily bulbs and the bark from the roots of young fruit trees. The most injurious in its habits of all the native mice.

Muskrat, *Fiber zibethicus* Linn.

Common along water courses and in swampy lands throughout the State. Frequently forages in truck patches and gardens adjacent to streams of water. Its skins are sold in such numbers that it has become the most valuable fur-bearing animal found in the United States.

Cooper's Lemming Mouse, *Synaptomys cooperi* Baird.

This mouse, by a casual observer, might be mistaken for a common meadow mouse. Its tail, however, is much shorter, being only five-eighths of an inch in length, and the fur is softer and fuller. It is a rare mouse in most localities. Surber has collected it at White Sulphur Springs. I trapped several specimens in mouse roads through the beds of sphagnum moss in Cranberry Glades and have taken it also along a little woodland stream at French Creek. It is said to feed on the stems of grasses, clover, etc. It is not seriously injurious in its habits.

Meadow Jumping Mouse, *Zapus hudsonius* Zimm.

I have records of this mouse, or its subspecies, *americanus*, from French Creek and Sherrard. Unfortunately no skins have been preserved and the records are indefinite.

Woodland Jumping Mouse, *Zapus insignis* Mill.

I have collected this beautiful little creature at French Creek, Cranberry Glades and at the foot of Turkeybone mountain, in Randolph county. It is said by Surber to be fairly common, but locally distributed, in the Canadian zone. I have found it very rare except in the vicinity of Cranberry Glades, where, in the summer of 1909, it seemed fairly abundant.

The jumping mice are about the size of the common house mouse but have tails almost twice as long. They are reddish-brown or yellowish-brown above and pure white beneath. The hind feet are very large, the head small and the form and coloring throughout graceful and delicate. The woodland jumping mouse may be distinguished from the meadow jumping mouse by its slightly larger size, larger ears and by having a white tip to the tail. When disturbed the mice of both species make prodigious leaps but in spite of this are rather easily caught as they do not seek holes in which to hide as do most mice when alarmed. Their manner of jumping is responsible for the name "kangaroo mouse" by which they are frequently known. In the fall as cold weather approaches these mice find some snug nest in which they curl up and sleep over winter. So far as is known at present they are entirely harmless.

Canada Porcupine or "Hedgehog," *Erethizon dorsatum* Linn.

There is little doubt that the porcupine was formerly found in considerable numbers in our higher mountain regions but it has now become very rare or entirely extinct. I have several unconfirmed reports of porcupines being seen or killed here in recent years. Dr. J. W. Hartigan, of Morgantown, has informed me that several years ago Mr. Thule Dolton killed a porcupine in a stone ledge near his home in Monongalia county. Dr. Hartigan purchased the specimen for fifty cents and had the skin mounted. Afterward some boys stole the specimen and carried it away. Authentic records of the occurrence of this species are very much desired.

Virginia Varying Hare; White Rabbit, *Lepus americanus virginianus* Har.

This interesting species is our only representative of a large group of varying hares that inhabit practically all the northern and western parts of the North American continent. In summer the coat of this rabbit is rusty brown and in the winter white. In its distribution in West Virginia it is confined to the laurel beds and dense spruce woods of the higher mountain districts. Occasionally, during long-continued cold weather, these rabbits will appear about settlements, in the vicinity of high mountains, where their presence creates no little interest.

The Bureau of Biological Survey has recorded but one West Virginia specimen. This was collected at Travelers Repose, Pocahontas county. During several collecting trips made to the higher parts of this State I have kept a constant lookout for white rabbits but have never seen a specimen. It is reported by hunters as being rather abundant in places on Shavers mountain, also on Black mountain. Mr. George Leichter has informed me that he was with a party of hunters in the fall of 1908 that killed three on Red Run, a tributary of Cranberry river. W. O. Johnson, of Romney, reports that he has seen a number during recent years in Caanan valley, Tucker county.

This rabbit is considerably larger than the common cottontails. It is shy and a swift runner so that it escapes both the eye of the hunter and the fleetness of the dog. Reports on its occurrence in different localities are much desired.

Eastern Cottontail, *Sylvilagus floridanus mallurus* Thomas.

The eastern cottontail rabbit is apparently confined, chiefly, in its distribution in West Virginia to the regions east of the Allegheny mountains. The common cottontail of our eastern and south-eastern counties probably belongs to this subspecies. It is occasionally found west of the mountains, as Mr. W. E. Nelson, of the Biological Survey, records 9 specimens from Wetzel county (N. A. Fauna No. 29.) There is little doubt that the western part of its range overlaps that of the next subspecies. In addition to the specimens from Wetzel county, Nelson records 8 from Pendleton county and 2 from Greenbrier county.

Mearn's Cottontail, *Sylvilagus floridanus mearnsi* Allen.

This subspecies is indistinguishable from the one just described except on close examination of a number of specimens representing both. The ears of Mearn's cottontail are slightly shorter than those of the eastern cottontail, the hindfeet being longer and the upperparts paler and more grayish. Its range in West Virginia, as given by Nelson, is the western part of the State.

New England Cottontail, *Sylvilagus transitionalis* Bangs.

A comparatively narrow strip of country extending from Maine

south to northern Georgia is the range of this rabbit. In West Virginia it is found chiefly along the Allegheny mountains. The Bureau of Biological survey has recorded 2 specimens from Travelers Repose and 4 from Greenbrier county. Surber says it is tolerably common throughout the mountain region of the State.

As compared with the two rabbits last described, this species is of about the same size, the ears are smaller, there is a distinct black spot between the ears and more pinkish buffy about the head and sides. There is also a marked difference in the shape of the skull. It is said to be more of a forest-inhabiting species than the others. So nearly do the three resemble each other, however, that the average hunter might bag examples of all and never suspect that he had anything more than "common rabbits."

The ranges of these species and subspecies have never been worked out carefully for this State. From a scientific standpoint it is desirable that this be done but economically it matters little since the habits of all are very similar.

Panther or Adirondack Cougar, *Felis couguar* Kerr.

The panther is believed by many to be extinct within our limits but there is a probability that a few still exist in our more secluded forests. I have several reports of panthers having been seen in recent years which seem impossible to discredit. It must be confessed however, that after tracing down numerous "panther stories" the proof of their presence in the State at this time is not entirely convincing.

This big cat once roamed through all the forests of West Virginia and fed on deer and smaller animals. It seldom attacked man but frequently killed domestic animals.

Canadian Lynx, *Lynx canadensis* Kerr.

There is little doubt that this species once frequently straggled into West Virginia from the forests farther to the north but it is doubtful if it ever occurred here in great abundance. It is admitted to this list on the strength of statements made by old hunters of its former occurrence in our high mountains and on its known range in Pennsylvania which extended to the southern border of the State.

Wild Cat or Eastern Bay Lynx, *Lynx ruffus* Guel.

Once abundant everywhere but now met with commonly only in our larger and more remote forest districts. Occurs rarely and irregularly in many old farming districts.

Wild cats are a terror to the harmless wild life of the forest. They catch great numbers of smaller mammals and birds that frequent the ground. They have even been known to kill deer. Poultry, young pigs and lambs often fall a prey to them. Their fur is of but little value and in their habits there is little to recommend them to the mercy of the farmer or hunter.

Gray Fox, *Urocyon cinereoargenteus* Schreber.

Originally this was the only fox found by the pioneers of West Virginia. It was distributed generally, though preferring the less elevated sections of the State. It is still common in some places and entirely absent in others. Surber says it is increasing in abundance in the mountains. Its thievish habits in the poultry yard and its lust for game and song birds make it deserving of the bad name it bears.

Red Fox, *Vulpes fulvus* Des.

It is probably something more than a century since the red foxes began to be noticed in West Virginia by the settlers. There are still many old hunters living who can remember their first appearance in certain sections. It is believed to have invaded the State from the north but from just how far north it originally began to spread southward is uncertain. There are some naturalists who believe it has descended from red foxes imported from Europe in colonial times.

Red foxes are now met with in some localities where no gray foxes have been seen for years, in other localities the grays are present and the reds absent while in still other localities both are more or less common. The valuable fur of the red fox has led to its being persistently sought after by hunters with hounds, traps and guns and the wonder is that any are left. Domestic fowls, birds and small mammals are its food.

Gray Wolf or Timber Wolf, *Canis mexicanus nubilus* Say.

An inhabitant, in early days, of all parts of the State, now almost certainly extinct within our limits. What is supposed to have been the last gray wolf in West Virginia was killed in Randolph county by Stofer Hamrick in January, 1900.

Otter, *Lutra canadensis* Schreber.

This animal although once fairly common has now almost disappeared from our State. It is still met with occasionally along some of the larger mountain streams. Fur very valuable.

Common Skunk or "Pole Cat," *Mephitis mephitis putida* Cuv.

Rather abundant in all parts of the State. Found in the farming districts of the lower elevations and more rarely in the forests of our higher mountains. I found one lying dead in a path through the dense spruce woods on the summit of Black mountain in October, 1896. Have trapped them near the head of Williams river in a forest remote from any human habitation. Were abundant in the vicinity of Cranberry Glades in the winter of 1908-9.

This is one of our few wild animals that is constantly variable in color, ranging from almost pure white to black. It is usually nocturnal in its activities but may be seen occasionally wandering about in old fields in the evening before darkness has fallen. The young are very pretty little creatures but they soon become unapproachable on account of the disgusting odor which they emit when disturbed.

This skunk occasionally raids poultry roosts and does some damage also by robbing the nests of ground-dwelling birds. These injuries are more than compensated for, however, by the value of its fur and by its destruction of noxious insects. At some seasons of the year its chief food, in farming districts, consists of white grubs, May beetles, crickets, grasshoppers and other insects that it finds about the surface of the ground. In the summer and fall of 1909 skunks dug out and destroyed innumerable underground nests of one of the common yellow jackets, (*Vespa vulgaris*), in the central and western sections of the State.

Alleghenian Spotted Skunk, *Spilogale putorius* Linn.

Recorded only from the lower parts of the southern and southeastern sections of the State. Thaddeus Surber has taken it at White Sulphur Springs where he says it is very rare. Alexander Wolf, a fur buyer of Huntington, says he gets a few skins of this species every year, mostly from the valley of the Big Sandy river.

At Franklin, Pendleton county, spotted skunks have been rather common for several years. 17 skins of this skunk were seen in two stores at Franklin in January, 1910. T. J. Bowman, who lives near that town, caught four in two weeks trapping in the winter of 1909-10. A skin of one of these is in my possession. It is reported by trappers as being found all along the valley of the South Branch of the Potomac although it is everywhere outnumbered by the larger species of skunk. The pelts of the striped skunks sell in the country stores at about 50 cents each while those of the common skunk are worth several times as much.

The spotted skunk is but little more than half the size of the more common species. It is rather handsome, being black with spots and broken stripes of white along the back and sides. The bushy tail has a white tip. It has the offensive odor common to skunks, which it is very free to make use of when disturbed. Hunters have told me that when chased by dogs it will sometimes climb a straight tree to a height of 50 feet or more.

This animal commonly goes by the name of "civit cat" which is a misnomer, as that name belongs more appropriately to the American civit cat, a raccoon-like animal that inhabits Mexico and the south-eastern part of the United States.

Notes on the range of this skunk in West Virginia are desired.

Mountain Mink or Black Mink, *Putorius vison* Schreber.

Found only in our more boreal regions. Surber says it occurs only in the spruce belt. Frank Houchin has taken it in the vicinity of Cranberry Glades where, he states, it wanders farther and more constantly away from streams of water than the brown mink described next. Smaller than the brown mink and the color a darker shade of brown, in some cases being almost black.

Brown Mink or Common Mink, *Putorius vison lutreocephalus* Harlan.

The common mink of hilly regions and lowlands in all parts of the State. Frequents water courses, large and small, but is especially fond of hunting along the banks of small woodland streams. Their long journeys are made mostly by night but they may occasionally be seen moving about by day. As a boy, I trapped many minks and regarded no bait for the purpose as being so good as a piece of freshly-killed rabbit. Occasionally visits chicken roosts but most of the food consists of small mammals and other form of animal life that it finds along streams.

New York Weasel, *Putorius noveboracensis* Emmons.

The common weasel found in almost every locality. In the colder mountain districts white individuals are found occasionally in winter. Farther north the color is always white in winter and brown in summer. In the Austral and Transition zones of this State the color is brown throughout the year but the winter pelage is a lighter shade of brown than that of summer. Kills poultry, rabbits and other small mammals and birds. Its victims are often bitten about the head or throat and only the blood taken.

Pennant's Martin or Fisher, *Mustela pennanti* Erx.

Fifty years ago it was not uncommon for the fisher or "black fox" to be taken in our forests. Of late years it has become very rare and may be extinct within our limits. Mr. E. C. Barrett, of Beckley, has informed me that he bought three fisher skins from Moses Stover, one in 1871, one in 1872 and one in 1873, paying for them \$3.00, \$3.50 and \$5.00. Stover caught the three animals on Clear Fork of Big Coal river. These were the last heard of in that section of the State.

In an early day fishers were often caught in log traps set by trappers for bears. They are accredited by old hunters of being so active that they could take the bait from a log bear-trap and spring out before the cover of the trap dropped into place. They

also annoyed trappers greatly by following lines of traps of other kinds and stealing the bait, without getting caught.

Raccoon or Coon, *Procyon Lotor* Linn.

Found in considerable numbers in many parts of the State. Abundant in the larger forests. A lover of roasting-ears. Coon-hunting by night with dogs, ax and gun has furnished delightful sport to the boys and men of almost every rural district. The fur is valuable.

Black Bear, *Ursus americanus* Pallas.

Once common but now restricted, as a rule, to the forest-covered mountains. Stragglers are occasionally seen in the more populous farming districts where their presence causes great local excitement.

The bear was an animal of considerable economic importance to the early settler. It furnished him with fur and meat and in return killed his pigs, sheep and other live stock. Reports of depredations in farming districts situated near to large wooded tracts are still heard. Twenty-five sheep belonging to Mr. W. O. Johnson were killed by bears in the Caanan valley in the year 1908.

Common Shrew or Masked Shrew, *Sorex personatus* Geoff. S. H.

Found in marshy places and damp woods in the higher parts of the State. I have collected it at Pickens, French Creek and Cranberry Glades.

This is the smallest of our mammals. Including its relatively long tail, it measures only a little over four inches in length. Most of its life is spent under ground. Its food is chiefly insects and other low forms of animal life. Like all the shrews, this species may be regarded as being beneficial on account of the injurious insects which it devours.

Smoky Shrews, *Sorex fumeus* Miller.

This shrew has been taken wherever I have trapped in suitable

places within the Transition and Canadian zones. It is often found in company with *personatus* but is rather more abundant than that species. Have collected it at French Creek, Cranberry Glades, Terra Alta, Pickens, Osceola, and in other localities.

The Smoky shrew is slightly larger than the common shrew but otherwise resembles it quite closely. Its habits are much the same. These shrews, on account of their diminutive size and retiring habits, are rarely seen even in localities where they are abundant. Their small size, very small eyes, pointed nose and soft, silken fur will serve to distinguish them from all species of mice, and their long tails from the two shrews described next.

Short-tailed Shrew, *Blarina brevicauda* Say.

Common everywhere in woods, fields and about gardens and lawns, may be distinguished from moles by its much smaller size and small, mouse-like forefeet. Eats great numbers of injurious insects.

Little Brown Shrew, *Blarina parva* Say.

Has been collected at White Sulphur Springs by Thaddeus Surber. Smaller than the short-tailed shrew. Sepia brown above and ash gray beneath. Habits are supposed to agree with those of other shrews.

Naked-tail Mole, *Scalpos aquaticus* Linn.

I have no records of this mole from West Virginia but from its known distribution in other states it should be found in our counties lying east of the Allegheny Mountains. Very similar to the next species except that the tail is not hairy.

Brewer's Mole or Hairy-tail Mole, *Parascalops breweri* Bach.

The common mole of all our region east of the Allegheny Mountains, live underground and feeds almost exclusively on an animal diet. Earthworms are one of its favorite foods although it takes grub-worms and other subterranean insects. In making its burrows through the soil it frequently casts out the earth and forms small mounds on the surface of the ground. Its large, hand-like

forefeet, pointed nose, small eyes and silken fur are too well known to require further description.

Star-nose Mole, *Condylura cristata* Linn.

Found in damp places in the Canadian and Transition zones. I collected one specimen on the bank of Big Run, Pendleton county, and saw one other near Osceola in June, 1908. Dr. John L. Sheldon, of the West Virginia University, caught a specimen near Morgantown a few years ago.

This mole is darker in color than the other two described and has a peculiar formation of radiating filaments on the nose which gives the species its name.

Little Brown Bat, *Myotis lucifugus* LeC.

Common in all parts of West Virginia. Apparently very little collecting of bats has been engaged in in this State, and the published notes in regard to their distribution here are very meager. I have found this species abundant at French Creek and Morgantown.

Say's Bat, *Myotis subulatus* Say.

Two specimens of this bat were collected at Aurora by Dr. C. Hart Merriam, of the U. S. Biological Survey.

Silver-haired Bat, *Lasionycteris noctivagans* LeC.

This bat is distributed from the Atlantic to the Pacific but probably does not breed south of the Transition zone. Surber lists it from the forests of the State.

Georgian Bat, *Pipistrellus subflavus* Cuv.

Surber says this species is very common in some sections.

Brown Bat, *Vespertilio fuscus* Beau.

Found in all parts of the United States south of the Boreal zones. Surber reports it as common.

Red Bat, *Lasiurus borealis* Mull.

Inhabits eastern parts of North America. Surber says "somewhat common."

In addition to the native species of mammals above we have the common house mouse, Norway rat and black rat which are European immigrants to America. The house mouse and Norway rat are excessively common and the black rat less abundant.

THE PRESENT CONDITION OF WEST VIRGINIA FOREST.

By A. B. Brooks, Forester West Virginia Geological Survey.

If we were to make a study in detail of the conditions that exist at present in the wooded lands of West Virginia it would be necessary to consider the entire area of the State, section by section—a thing impossible in a short and hastily prepared article. A forestry publication now being issued by the State Geological Survey takes the country as a unit for the discussion of this subject, but, owing to the great diversity of conditions that are to be found in some places, perhaps within the boundaries of a single county, many important details are necessarily omitted even in a report of this kind. Local variations are apparent on every hand. In one section uncut forests of softwoods abound; in another there is a stand of virgin hardwoods; in another culled and fire-destroyed woodland; and in another scattered patches of land overgrown with brush and worthless trees. In some regions there are enormous stands of excellent timber, untouched by lumbermen and unscarred by fires; in others vast areas have been laid waste and rendered useless through the almost total destruction of vegetation and soil.

At one time forests covered the State almost completely from Jefferson to Wayne and from Hancock to McDowell. The geographical positions, the climate, the elevation, the topography and the soils are such as to make the whole area a most favorable one for the healthy existence of a great variety and a great quantity of valuable timber trees. So naturally, in fact, do trees of one kind or another spring up and grow that nearly the whole area of lands that are now cleared would again revert to forest

should the operations of lumbering and agriculture be suspended for a comparatively short period of years. Trees grow almost as readily in most localities as do weeds in neglected gardens; and even in our most thickly populated districts woodland is rarely, if ever, out of sight.

If all our forest areas were in prime condition and could be so kept, there would be no lack of timber for us and a large amount to spare. The discouraging feature of the situation is that the timber is being so rapidly consumed and that so much of the woodland now seen on every hand is composed of trees that have but slight value. On the other hand, however, the tendency toward natural reforestation furnishes the greatest encouragement to those who are interested in the improvement of forest conditions. The planting of trees is expensive, even for a state, but almost any owner of wooded land, without money and with but little effort, can provide for the natural growth of valuable kinds of trees on his property and may live to reap profitable returns from at least one or two crops of fast-growing species.

For the purpose of a general survey of the situation the woodland of the State may be divided into three classes, viz: the virgin areas, the cut-over areas, and the farmers' woodlot areas. It will be understood that the first class named embraces the forests that still remain in their original state; that the second class includes the culled woodland held in large tracts, usually by lumber and coal companies; and that the third class is constituted by the thousands of small woodlots connected with cleared farm land throughout the State.

A recent inquiry into the condition of West Virginia forests has shown that there are approximately 1 1-2 million acres of virgin forest, 2 1-2 million acres of cut-over forest, and 5 million acres of woodlots. The principal virgin and cut-over forests of the State lie east of a line drawn from the Fairfax Stone, at the source of the North Branch of Potomac River, to Charleston, and extending in the same direction to the Big Sandy River. The natural forest region of the State adjoins this line in a belt of varying width and includes large portions of Tucker, Grant, Pendleton, Randolph, Webster, Pocahontas, Greenbrier, Nicholas, Clay, Fayette, Raleigh, Boone, Logan, Wyoming, McDowell, and Mingo counties. In some of these counties there are extensive areas of agricultural land of a very superior quality and in all there are

areas of greater or less extent which have been opened for agricultural purposes; but the percentage of woodland and of non-agricultural land is high. These are the counties, also, in which most of the rivers of the State have their sources and whose far-ests are deserving of special protection on account of their influence on water supply and distribution.

The seven counties having the largest area of virgin forest still standing are Pocahontas with 212,000 acres, Randolph with 195,000 acres, Greenbrier with 140,000 acres, Pendleton with 138,000 acres, Nicholas with 130,000 acres, Webster with 122,000 acres, and Raleigh with 117,000 acres. The most extensive cut-over areas are in the recently lumbered sections of the counties named above and those adjacent to them along the Alleghany Mountains and in six or seven counties south of the Great Kanawha River.

The whole western half of the State and several of the counties east of the mountains have only here and there scattered boundaries of woodland which are of sufficient size and possess a sufficient quantity of timber to justify us in classifying them as forest land. The area which is in woodlots in these regions varies from about 15 to 60 per cent. the woodlots differing almost as much both in the quantity and the character of their timber trees as do the virgin and cut-over forests. There are some counties—of which Monroe, Upshur and Ritchie may be taken as fair examples—where there are numerous woodlots that contain a great deal of valuable timber; and there are others along the Ohio River and on the extreme east where the average woodlot no longer affords anything more profitable than inferior cross-ties and poles, and these in comparatively small numbers.

We are justified by the conditions found in the carelessly-managed woodlots throughout the State in asserting that methods almost wasteful have been employed by the operators of lumber plants, whose extravagance is so often justly decried. A moment's reflection will convince even the casual observer who has traveled over West Virginia that there is scarcely a single farm within our borders which has not at least a few acres of rough land that is unfit for cultivation. These places might be made to grow valuable stands of fast-growing trees, such as yellow locust, and at the same time be immensely valuable as protectors of springs and small watercourses, and greatly beneficial in checking erosion of soils. Many thousands of acres, in the aggregate, of such areas

as these are at present overgrown with laurel, sassafras, scrub oaks, briars, or other forms of more or less worthless vegetation. Farmers practice heedless abuse upon their woodlots almost universally. The cutting of poles and trees for all manner of domestic purposes is generally indiscriminate; fires are permitted to burn through small areas at frequent intervals in many places; and cattle and other domestic animals are permitted to browse the leaves and tender twigs of valuable seedling trees which are the only promise of a future supply of timber.

The present conditions almost everywhere forces upon us the truth that the time for preventable waste should be at an end; and that the time for efforts toward reconstruction, both in large and small forest areas and by all classes of owners and by every citizen of the State, is unquestionably here. The eighty-three mammoth hand saw mills and the hundreds of smaller mills now in operation are making rapid progress in the reduction of the larger forests. The virgin timber is being manufactured in a single county at the rate nearly a million feet a day. The uncut forest will soon be a thing of the past unless strenuous measures are taken to lessen the present enormous consumption of about 1 1-2 billion feet of our lumber each year, or to preserve a remnant by Federal or State purchase or otherwise of the magnificent forests that still remain. The cut-over forests are being re-entered and every nook and corner is being ransacked for timber trees. Soon the rural people of the State must depend more upon their own resources in respect to timber and the woodlot must be made to yield the product which has heretofore been drawn from the larger adjacent forests.

In view of the experiences of other states and of other countries and our knowledge of the rapidly waning supply of timber, it would seem no longer an act of intelligence, even, to assume an attitude of indifference toward this subject, nor an act of good business economy to delay in providing against a threatened period of want.

Forest Conservation and Protection.

By J. A. Viquesney, State Forest, Game and Fish Warden.

One of the greatest questions that has agitated the whole country—in the past decade, is that of the conservation of the

vast natural resources of this country, the leading division of same—being the conservation and protection of our forests and timber.

Experts calculate that at the present rate of cutting, the great forest areas of the United States, will be almost exhausted in twenty years. In view of this, the government has undertaken the administration of the forests remaining on its land in the West, and has set apart more than 240,000 square miles of their land for this purpose, which territory would make ten states the size of West Virginia, and will be used to grow timber for the use of future generations.

This land is divided into 159 tracts, called "National Forests", the mature trees on these tracts being sold for lumber, the growing growth being protected from fire and other destructive agents, and thus—through this system, will reforest same, and through this system is intended to grow crop after crop of timber, just the same as the farmer grows crops of corn or other products.

But large as the National Forest are, they are only a little more than one-fifth of the total forest area of the United States. Where the government owns one acre of forest, private individuals and companies own four; so it can readily be seen that the government cannot solve the whole problem. Private individuals, companies and states must take up this work, for they own four-fifths of all the timber of the United States.

If the timber famine, which threatens the whole country, is to be averted, then some system must be devised whereby private individuals and companies must handle the proposition, as the government is handling its forest land, by stopping needless waste, cut mature trees only, let the saplings stand, and protect same from fire. There are many things which are necessary and important in the conservation of our forest areas, but protecting them from fire, is the principle thing to be done, and, in fact, if this is not done, other things will be of little avail.

It cannot be denied—but that a state has the right, and it might be urged, that it is the absolute duty of every state to take this matter in hand and protect our great forests from fire, and see that in other ways—they are not destroyed. Protection against fire is a public necessity, and should not be left to the care of private individuals.

Few states in the whole Union have so much to gain by protecting their forests—as West Virginia, and few states have done so little in this direction as we have. The State of West Virginia has less than 25,000 square miles, and 18,000 square miles of this is forest. This includes, however, cut-over and burned over tracts, many of them having but little value at the present time, and some of them having been burned over by fire so many times, that they are ruined for all time.

To the thoughtless individual, a law looking toward the conservation of the forests of West Virginia, might seem foolish at this time, but to the close observer, or the one that has made these matters a study, it is conceded to be one of the greatest problems that confronts us today.

The white pine, which a few years ago extended in a broad belt across the state, following the parallel ridges of the Allegheny range, is almost a thing of the past, and the hemlock and the spruce are now going the way of the white pine. One has but to witness the tracts of timber that are now being cut in West Virginia, especially the ones where pulp wood is being taken off, to grow sick at heart, to witness these once beautiful forests areas stripped of every living particle of timber, and left unprotected and unguarded from the forest fires—that year after year burns over these tracts until they are completely ruined for all future time.

By all rules of forest economy, these saplings should not be cut, and the State certainly should have a right to enact a statute controlling such matters, and save this great asset for the use of future generations.

Tanneries, in the search for bark, have literally wiped out forests which formerly seemed exhaustless, and saw-mills following the bark peelers, have consumed the trunks of trees, and the destructive forest fires following the saw-mills, have consumed most everything else.

The situation is not yet hopeless, but is, in a way, discouraging, and the time is here when something must be done along this line, if it is ever done.

A great portion of the hardwood tracts of timber yet remain in our State, and if we are to ever have a forest policy, now is the time to begin, for a forest policy will be of no benefit to us ten or twenty years from now—when our forests have all been depleted

by our present methods of cutting and wasting our timber.

It is not the design of the forestry law, to make parks out of woodlands, neither is it the intention to hinder the sale of timber that should be cut and used, but the intention to stop waste and useless extravagance in the methods of destroying the timber that is of but little value at the present, and, will, if let grow, be of untold value in the future, not only to the owner, but of great value to the public in various ways.

The last session of the Legislature deserves some credit at least, for making a start in the great work to be done in West Virginia—toward this end. An appropriation was included in the amount appropriated by the Legislature for the geological survey, for a State Forester, whose duty it was to make a thorough investigation of all matters pertaining to the forests of West Virginia. Prof. A. B. Brooks was appointed State Forester, and is now preparing his report to the coming session of the Legislature, which will be the basis on which to build the future forest policy of our State.

In addition to this, the office of Forest, Game and Fish Warden was created, abolishing and superseding the old office of Game and Fish Warden. The Forest, Game and Fish Warden was also designated as "Fire Warden" and was given jurisdiction over the forests of the State, and it was made his special duty to attend—by himself or through his deputies, all forest fires, and by summoning aid, assist in extinguishing these fires, and while on account of the deputy service not being provided for as it should be, this work has not been entirely satisfactory, yet the work accomplished, and the great savings made in the timber and forest interests—by the operation of this law, demonstrates at least, what can and will be accomplished under a more perfect system of fire protection.

Until after the passage of the law referred to, no effort had ever been made, from an organized stand point, to control or extinguish the fires, and in the year 1908, according to data collected by Hon. Hu Maxwell, in charge of this branch of the United States Forestry service, there occurred 710 different forest fires burning over 1,703,850 acres of timbered land, doing damage to the forest products of our State, to the amount of \$2,903,850; while in the year 1909, here only occurred 70 fires, burning over but 94,322 acres, with an aggregate damage of \$107,053.10, mak-

ing a total difference of damages for the two years, of \$2,796,-458.90, which amount of money would pay—not only the cost of maintaining the department of Forest, Game and Fish, for a term of three hundred years, but would also pay the expenses of a permanent State Forester for hundreds of years.

In the year 1909, the forest fires numbered 223, burning over 90,407 acres, damaging forest products to the amount of \$43,-874.09.

The cost of extinguishing these fires for the year, 1909, the sum of \$1,305.76, and for the year 1910, the sum of \$3,677.52. We never fully realize the great blessing that has been so bountifully bestowed upon us by nature until we are deprived of them. This is the reason that the people of West Virginia are so slow to realize the great wealth that we possess in our great forest areas. To one who has not made a study of this problem it would seem that our forests are inexhaustible, and scarcely a thought has been given to this great question by the ordinary citizen of West Virginia.

It may not be necessary at this time to engage in the planting of trees as is being done by many states in the Union, but it is absolutely necessary, if we are to save our forests from total destruction in the next twenty-five years, to protect them from the destructive fires, and to take some action and formulate some policy to properly control the cutting of timber in the State of West Virginia.

It is useless to lock the stable door after the horse has been stolen, so will it be of little avail to enact forest legislation after our splendid woodlands have been depleted. The time for some effective action is here, and if we are to profit by the mistakes that other States have made in delaying the work of protecting and saving their forests, it must be done at once.

“A stitch in time saves nine,” is true perhaps, in a greater degree in extinguishing a forest fire than in any other work, so is it true with regard to our forests in protecting the young timber from the useless destructive methods in cutting, and in carelessly breaking it by cutting larger timber.

Much can be done to aid in this work if taken in hand and conducted from a scientific standpoint, by men who have made the subject of forestry a profession.

The Farmer and Forestry.

By A. W. Nolan, Professor of Forestry, State University, Morgantown, W. Va.

The most practical purpose of modern forestry is to conserve the forests by wisely using them. The motive is not that of a miser, to hoard and save for the sake of saving, nor is it to wastefully use with no thought of future generations; but the idea of modern forestry is to use the forests in such a way that there shall always be a crop of trees coming on. It is a sad fate of the fine old forests that it is to be cut down, but it must be,—civilization needs the wood for homes, schools, churches and business:

Not long ago the writer rode from Hendricks, West Va., to Thomas, W. Va. and saw that ten miles of splendid virgin forest of Hemlock, belonging to the Babcock Lumber Co. It is sad to realize that this splendid forest must soon go, for the axe is already laid at the root of the tree, and yet we can censure no one,—the trees are mature, they are in danger of fire and they will serve the greater good perhaps in lumber. The wrong that is sure to result from the removal of this grand old forest, is that the land will be stripped so completely, the young growth destroyed, and the soil so burned over and depleted that future growths of such forests are made impossible within appreciable time. The ever rising question comes again, is it practical for such big lumber companies to harvest nature's crop and yet to leave the forest in condition to regenerate itself? It is a question of the conflict of pocket-book and patriotism, and it is for the big lumberman to settle it as he wills. It is encouraging to note that several large lumber companies of the country are practising forestry instead of destructive lumbering.

Another great responsibility for the control of some of our forests lies with the State and nation, thru the ownership of reservations. Here we see forestry practised in its essence. Trees are grown and harvested as a crop, and the forest remains permanent all the while. Even though the nation does own nearly 200 million acres of forest, and private and corporate interests own many millions more the greatest bulk of our forests is owned and controlled by the farmers. We must look to them for our future timber supply. Are they using and conserving wisely this great natural resource?

It is more practical and of more general value to the country, that the farmer practise the principles of good forestry on his woodlot, than that the government own large reservations. There are many reasons why the farmer should and could be governed by modern forestry principles in the management of his woodlot. The land is his, he has time to look after his forest, to study its needs and requirements; he needs the timber for farm operations; he can protect it from fire, preserve the young trees, and plant more as needed.

If all of the eight million farmers of this country would plant or wisely manage woodlots, the general forest conditions and the lumber supply of the country would be greatly improved.

Planting forests is not a new unheard of thing. The seedlings of such trees as catalpa, black locust, walnut, ash, and poplar, may be purchased for small sums, and an acre of land will support from 500 to 1000 of these trees. The trees should be planted on land prepared as if for a corn crop, and set from six to eight feet apart each way. The young trees should be cultivated for the first four or five years, or until the crowns touch and the canopy entirely shades the ground. In a comparatively short time the young forest will be full of promise, even within the life-time of one generation.

If the farmer already has a woodlot so much the better. His scientific forestry then will consist of cleaning out worthless, dead, misshapen or crowded trees, and giving all valuable species every advantage of root and crown space. If fire is kept out, and grass is shaded down, the forest will naturally regenerate itself, and the farmer may use the mature trees, and the thinnings from his woodlot without impairing the permanency of his forest.

NEED FOR PRACTICAL APPALACHIAN FORESTRY.

by Hu Maxwell, Washington, D. C.

Two central and important facts come at once into prominence in any consideration of forest questions which relate to West Virginia or the region surrounding it. The first is that the timber supply is being rapidly depleted, and the other is that a serious deterioration is taking place in the forest soils. The soil deterior-

ration in a direct consequence of the neglect and abuse of the forests. These two cardinal facts reach far and wide and are intimately related with conditions and results of many kinds. Every industry of the State is concerned with these matters, and the correction of abuses which have so greatly injured the forests comes as nearly being a State-wide question as anything can be.

Many persons look upon forestry as something new, the latest fashion, so to speak. Nothing be farther from the truth. It is somewhat newer in this country than in Europe, but it is as practical as anything can be, and it comes as close home to the people as any question of the day.

The vital point toward which all efforts ought to be directed is the timber supply. It is going. Though somewhat late in the day to take that matter up, it is not too late. Had the people realized the importance of the matter fifty years ago, there would be no crisis now, but they did not realize it, and the crisis confronts us, and we must face it, and avert it if we can.

Forestry in its technical sense stands among the sciences as poetry among the fine arts—the easiest to dabble in and the hardest to master. But it is not necessary to master it in all its technicalities in order to understand what it means and get practical results. At any rate, the chief problems confronting West Virginia are not such as require immediate resort to the complicated and expensive methods of forest management practical in Germany and France. If we postpone the matter a few decades longer we may have to do it that way or abandon many of the mountain regions to ruin; but if a beginning is made now, and in dead earnest, there remains a short road to the solution of most of the problems, and without the enormous expense which some countries have been compelled to shoulder because they would not begin in time.

A good forest fire law well executed will solve half the problem. The other half includes a larger number of details, but principal features are the following: More care in cutting timber so that the young trees will be left to grow, together with a few seed trees. The planting of timber trees by individuals on rough corners of their farms.

That sums up West Virginia's forest problems in a nutshell. Of course, it is easier said than done, but a great deal of it can be

done without becoming an excessive burden, and there is nothing about it which cannot be easily understood by any person of ordinary intelligence.

One important point ought to be emphasized, and that is the necessity of winning the support and sympathy of the people. It can not be done by drastic laws and severe penalties or by long sermons and dry lectures but will be attained rather by leading the people to see that forestry will pay. Show them that a few acres of good timber, growing and increasing in value, on the poor spots of their farms, will be more profitable than that many square miles of running-briars and sassafras. Make this clear and they will begin to figure how they can obtain the young locust, oak, chestnut, or walnut trees and plant them. No technical forest learning is required, just plain, common sense.

In a broader way the same method will hold with lumber operations. The millman will not cut his land clean and abandon it, if he can figure out that it will pay to leave something to come on for the next cutting. Protect the land from fire, and also protect it against unjust taxation, and the owner will begin to practice forestry. As soon as he sees money in it he will do it, and not till then. The kind of forestry that will work in West Virginia is the kind that brings in money. Trees for shade, shelter, ornament, and beauty are desirable things, but the income from plantings of that kind is not so apparent as from those which sell for cash.

The planting of wood lots on rough farm corners, and conservative cutting in lumber operations, are matters which the owners of the land can properly look after, and they will do it as soon as they see profit in it. But the fire problem is too large a matter for the individual to handle. The State and counties ought to do that. An owner can not protect his own land from fire unless surrounding lands are protected, although he can plant trees on his land, or cut his timber in the right way, whether his neighbors treat theirs in the same way or not. The State's duty goes at least to the extent of protecting all forests from fire, no matter who owns them. When that is done, the individual owners can do a great deal of what remains.

The most urgent need, next to protection against fire, is education; not schools for training professional foresters, but information that will acquaint the people with what they ought to do,

how they can do it, and the benefit from doing it. This is a work which can not all be done at once, nor all in one way. Agricultural societies, granges, farm journals, and lecturers have been doing good work educating farmers in better ways of farming. In exactly the same way and by precisely the same means can education in practical forestry be brought to the owners of land. No agency more powerful in spreading practical information among the people can be found than the newspapers. That means the grown-up people, not the children who attend public schools. Lecturers and the writers of books are doing much in their lines; but when it comes to the practical affairs of life, the daily questions of living and making a living, of getting and exchanging ideas, of finding, explaining, and using better ways of doing work, the newspaper that goes into the boxes along the rural routes, is the power behind the throne of the country people.

Having referred to some of the things that ought to be done and to some of the methods of doing them, it is proper to allude briefly to the material available, and to its present condition.

A century and a half ago the area now covered by West Virginia had nearly 16 million acres of forest, and perhaps 150 billion feet of timber. It now has less than 10 million acres and about 30 billion feet. The wooded area has shrunk one-third while the quantity of timber has decreased four-fifths. This means that the woods are being thinned all over, and are not suffering much from the inroads of clearings for farming purposes. If the lands were adapted to agriculture, and were being cleared for that purpose, we could strain a point to let the forests go, because agriculture is the highest use to which lands can be put. But comparatively little of the remaining wooded land in the State is fit for the plow. It is too poor, too rough, or too steep. It ought to be kept in timber. One-half of West Virginia can never be and ought never be put to tillage. The other half is fit for farming and grazing and ought to be so used.

The standing timber in the State will last 25 or 30 years at the present rate of cutting. That leaves out of account what will grow in the meantime and what fires will burn. Both of these quantities are uncertain. But there is little uncertainty as to what the quantity of growth will be if fires are to continue. There will be none worth speaking of. The annual destruction by fires now equals, if it does not exceed, the annual growth. There is no

sure way of estimating the one or the other: but the fact that the forests of the State are becoming thinner much more rapidly than the lumbermen are thinning them, gives a fairly sure gage of destruction by fire.

It is the part of the land which can not or ought not be plowed which claims attention from the standpoint of forestry. It can be utilized and made profitable for timber growing, and for soil protection, and for the regulation of stream flow, or it can be abandoned. If it is cared for, it will be perpetually profitable. If abandoned, and left a prey to fire and to erosion, the time will come when it will be as barren a desert as the summit of Spruce Mountain now is or the Roaring Plains on the summit of the Alleghany. Not only will the land itself be rendered useless, but the very soil will finally be the ruination of good lands and of river navigation lower down. The sand and soil from the steep, treeless slopes will fill the channels of streams and cause worse floods, and more of them, than have yet occurred. The danger of this is not a thing that will come only at the end of generations or centuries. It not only will come, but it has come, and is coming. The increase in floods in West Virginia streams runs from 28 to 83 per cent, so far as measurements have been made, and low water conditions are far worse than they used to be. Rainfall is about the same as in the past, but the rivers are carrying more water. Where the flow was formerly somewhat regular, it now acts by fits and starts. The water comes by rushes and is quickly gone.

That is the direct result of forest thinning and soil injury. The havoc wrought by fires constitutes a menace which can scarcely be overestimated. The danger is greater than anyone seems to imagine. The worst is yet to come. Forest and soil thinning must proceed to a rather advanced point before the effect on streams become clearly apparent. After that point is reached, results accumulate very rapidly. The danger point in forest destruction is often reached and passed before the danger is discovered, unless the history of other deforested regions is consulted, and cause and effect are studied there.

Deforestation and soil destruction have reached and passed the danger point in the drainage basin of every river in West Virginia, but the worst conditions exist about the sources of the Monongahela, Potomac, and Kanawha. Take the Potomac. It is the

smallest sufferer of the three rivers named, but more complete data may be had for it than any other large stream flowing from West Virginia mountains. A report by the United States Geological Survey, published in 1907, shows that 838 square miles of forest soil on the Potomac had been so damaged by fire that the humus was practically destroyed, and double that area had been burned so badly that the soil was greatly damaged. The entire basin of the Potomac, under consideration, contains less than 10,000 square miles. The black burn of 2,500 square miles is more than a fourth of the whole basin.

Figure a little, and see what that means. The burning of the humus from that soil lessened its capacity to absorb storm water by no less than six billion cubic feet. That would equal a rainfall of one inch. Six billion feet of storm water, poured quickly from that burned area is enough water to maintain a 10-foot flood for 30 hours in the Potomac at Harper's Ferry. That much water now goes off quickly after a storm, that formerly was held by the loose soil, and was allowed to flow gradually away. Does not this help to explain the flood increase in the Potomac? Yet, the Potomac has suffered less than the Monongahela and the Kanawha.

Instances and examples might be multiplied without limit, all exhibiting the damage to timber, soil, farm lands, and rivers from forest fires. The fight against fire belongs to the State, and the counties. It is too big for the individual owners. The farmers can plant trees, the lumberman can cut with an eye to the future, and the State and counties can handle the question of fire protection. There is work for all, and the work grows greater with every day of delay.



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